

Serial No. 09/484,348

REMARKS

This amendment is responsive to the official action dated August 12, 2003.

Claims 22-35 were pending in the application. Claims 22-35 were rejected. No claims were allowed by the Examiner.

By way of this amendment, the Applicant has amended Claim 22. Claims 23-35 remain unchanged.

Accordingly, Claims 22-35 are currently pending.

I. **REJECTION OF CLAIMS UNDER 35 USC 103**

Claims 22-26, 28-29, 32 and 34-35 were rejected under 35 USC 103(a), as being unpatentable over US Patent No. 5,266,794 (Olbright et al.). The Examiner stated that with regard to Claim 22, Olbright discloses an integrated light emitting and photo detector device formed on a semiconductor substrate, wherein the optical receiver is formed laterally adjacent to the optical transmitter. The Olbright device, however, as clearly described in the disclosure, is formed to become a single switch module in a three dimensional switching array.

(Col. 3, Ln. 48-52) The present invention is based on utilizing high-speed vertical-cavity surface emitting lasers (VCSELs) that are integrated with transistors and high-density electronic logic to form three-dimensionally interconnectable optoelectronic integrated circuit (OEIC) modules

It is clearly disclosed that radiation from adjacent modules establishes connectivity between each module. The disclosure further states that the construction specifically provides for a linear, upward communication between the modules, wherein radiation from the adjacent OEIC modules can be received along three potential input channels and then retransmitted using the adjacent VCSEL transmitter.

(Col. 8, Ln. 47-58) As illustrated in FIG. 8, optical radiation from adjacent OEIC modules, which have been indicated by input 1, input 2 and input 3, establish connectivity from each OEIC module. Optical radiation designated as "output" provides connectivity to

Serial No. 09/484,348

the adjacent OEIC module. It should also be noted that to facilitate optical radiation to be received from an upper OEIC module, i.e., input 3, the upper OEIC module should utilize a "HBT-up" configuration which easily allows the output radiation to be emitted upward or downward. For a "HBT-up" configuration, the HBT is fabricated above the VCSEL.

The photo detector section is formed to work in interlocked relation to the VCSEL section by communicating through the substrate and in particular by communicating through the semiconductor substrate having logic etched thereon.

Further, the actual structure of the photo detector is specially formed to receive light signals from both the front and the back. In addition, the VCSEL includes a HBT/HPT photo detector base upon which it is built. In this manner, the construction allows the module to receive and process incoming signals from three different points. In response to this input, the module will then selectively repeat the incoming signal using the VCSEL portion of the module. It is a critical component of the disclosure that the photo detector and VCSEL be allowed to communicate. It is also clear from the disclosure that the photo detector and VCSEL sections must be separated by a relatively large distance to prevent interference between signals received at the rear of the photo detector and signals received at the rear of the VCSEL. If these two components were placed too closely on the substrate, cross talk and poor switching results would be produced.

The Examiner has stated that it would have been obvious simply to isolate the photo detector components from the VCSEL element. No support has been provided for this obvious modification to the Olbright disclosure. In fact, if one skilled in the art were to electrically isolate the receiver components from the transmitter components, the entire device would be rendered inoperable. It is clear that if the receiver elements and transmitter elements were isolated from one another the Olbright device simply would be incapable from operating in a three dimensional switching array. The input that was received on the receiver components could not be relayed to the VCSEL because the connection would not exist. If the signal could not be relayed to the VCSEL, it could not be repeated up to the next layer in the three dimensional switching array and would simply die out at this point in the array. In fact, if the module in Olbright had receiver

Serial No. 09/484,348

elements that could not communicate with the VCSEL transmitter it would be considered defective and removed from the array as it could not possible function properly.

Given the above discussion it is highly unlikely that one skilled in the art would have the motivation to isolate the transmitter from the receiver unless that motivation was the desire to render the device inoperable.

In contrast, the present invention specifically provides a critical electrical isolation region between the receiver and transmitter sections to electrically isolate them from one another. Further, as amended the claims of the present invention require that the receiver and transmitter are shielded against cross-talk thereby allowing them each to operate independent of the other.

This isolation region is in the form of a proton injected area if the substrate that prevents electrical conductivity across the region. In this manner, while both the transmitter and receiver are mounted onto the same semi-conductor substrate, they are electrically isolated from one another allowing completely independent operation. This is the feature of the present invention that allows the module to be used for simultaneous TX/RX operations in the high-speed transfer of data over paired fiber runs. Further, this isolation area allows the transmitter and receiver to be formed more closely to one another on the substrate, while preventing cross talk and interference between the two parts of the module. This feature of the present invention is important to allow the module to be employed with dual mode fibers, where two fiber conductors, separated by only 250 microns, are bundled together into a single core and jacket. This close spacing between the transmitter and receiver was previously unattainable in the prior art.

The Examiner also relies on the following as a claim that Ohlbright discloses disabling inactive VCSEL layers by disabling associated transmitters.

(Col. 4, Ln. 20-24) It will be apparent to those skilled in the art that some of these interconnections may be disabled by electronically disabling the associated transmitters to establish any predetermined interconnection scheme.

However a cursory reading of this passage would reveal that what is disclosed is the disruption of the operation of an entire transmitter structure not discrete layers within the device itself. This disclosure related to selectively electronically disabling a stacked

Serial No. 09/484,348

VCSEL structure. The present invention is directed at disabling specific layers during the formation of the VCSEL to prevent it from cross-talking to the adjacent photo detector through the GaAs substrate material. There is no similarity, correlation or interchangeability between the macro electronic level VCSEL control disclosed in Olbright and the micro level structural features that are built into the TX/RX pair of the present invention.

Despite the attempts at hindsight reconstruction, since the present invention specifically recites subject matter that is not disclosed in Olbright, the rejection is not believed to be applicable. Further, since one skilled in the art clearly has no motivation to destroy the device disclosed in Olbright by simply introducing a means for isolating the transmitter from the receivers it would not have been obvious to simply make the substitution suggested by the Examiner to arrive at the present invention.

Specifically, since Olbright does not disclose the provision of electrical isolation between the transmitter and receiver sections of the module to allow independent operation of the two units, and since making the substitution suggested by the Examiner would render the device completely inoperable, the disclosure in Olbright cannot render the disclosure in the present invention obvious. Therefore, reconsideration and withdrawal of this rejection is respectfully solicited.

II. REJECTION OF CLAIMS UNDER 35 USC 103

Claims 30-31 were rejected under 35 USC 103(a) as being unpatentable over Olbright in view of US Patent No. 5,136,603 (Hasnain et al.). The Examiner has stated that as applied above Olbright discloses the present invention with the exception of an intrinsic layer in the photodiode to provide an improved PIN type diode that enhances the confinement of the carriers. The Examiner further stated that since Hasnain discloses the use of PIN type photo diodes, it would have been obvious to one skilled in the art to combine the references to render the present invention obvious.

As stated above, with respect to Olbright, the combination of these two references is devoid of any teaching regarding the isolation of the two components in the module. There is no teaching either alone or in combination of these cited references that provides for the placement in close proximity of the photodiode and VCSEL portions

Serial No. 09/484,348

of the module through the use of a proton injected isolation region. While in view of the disclosure provided in the present invention it may be obvious to create this side-by-side construction utilizing isolation regions and a PIN type photo diode, the present reference is not available for citation against itself. Therefore, the Examiner is simply utilizing hindsight reconstruction to attempt to render the present invention obvious in view of its own disclosure.

While the use of an improved PIN type photo detector does allow the two components to be placed more closely to one another, without the required isolation area, the present invention would suffer from a high degree of cross talk and interference rendering it ineffective. Further, as stated earlier, the present invention provides for a side-by-side construction, not a stacked construction as provided in the cited references.

Since the references cited by the Examiner cannot be combined to arrive at the invention of the present application, is not believed that the present invention is rendered obvious in view of the combination. Therefore, the Applicant requests withdrawal of this rejection.

Claims 27-33 were rejected under 35 USC 103(a) as being unpatentable over Olbright in view of US Patent No. 5,498,883 (Lebby et al.). The Examiner has stated that as applied above Olbright discloses the present invention with the exception of cladding layers on the top and bottom of the active layer in the VCSEL to improve the confinement of the carriers. The Examiner further stated that since Lebby discloses the use of cladding and anti-reflective layers in VCSELS, it would have been obvious to one skilled in the art to combine the references to render the present invention obvious.

As stated above in the comments related to Olbright alone, the device in Olbright provides for a module that includes a photo detector and a VCSEL that are designed to work in conjunction with one another to receive and process signals from both the front and rear sides of the substrate that are then processed to activate the VCSEL to relay the signal as necessary. Should one skilled in the art apply the cladding layers described in Lebby to the Olbright disclosure, the present invention would still not be disclosed. The present invention includes specific isolation limitations that restrict both electrical and optical interference and eliminate cross-talk that are not disclosed in the

Serial No. 09/484,348

cited prior art that allow the two elements, namely the transmitter and receiver, mounted in close proximity on the module to function entirely independent of one another. The Olbright devices are inextricably linked as provided in their own disclosure. If they were not, the device would not function.

Since the references cited by the Examiner cannot be combined to arrive at the invention of the present application, is not believed that the present invention is rendered obvious in view of the combination. Therefore, the Applicant requests withdrawal of this rejection.

Since the references cited by the Examiner cannot be combined to arrive at the invention of the present application, is not believed that the present invention is rendered obvious in view of the combination. Therefore, the Applicant requests withdrawal of these grounds for rejection.

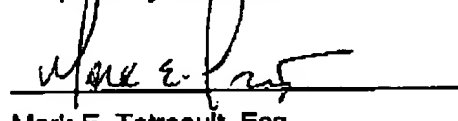
III. CONCLUSION

Accordingly, claims 22-35 are believed to be in condition for allowance and the application ready for issue.

Corresponding action is respectfully solicited.

PTO is authorized to charge any additional fees incurred as a result of the filing hereof or credit any overpayment to our account #02-0900.

Respectfully submitted,



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